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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/538,822	08/18/2006	Sung-Man Lee	CMT0022US	5934

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CANTOR COLBURN, LLP  
20 Church Street  
22nd Floor  
Hartford, CT 06103

EXAMINER
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YANCHUK, STEPHEN J

ART UNIT	PAPER NUMBER
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1795

NOTIFICATION DATE	DELIVERY MODE
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07/20/2010

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

usptopatentmail@cantorcolburn.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/538,822	<b>Applicant(s)</b> LEE ET AL.	
	<b>Examiner</b> STEPHEN YANCHUK	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 19 April 2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/13/2005</u> .   | 6) <input type="checkbox"/> Other: _____                          |

**DETAILED ACTION**

***Election/Restrictions***

1. Applicant's election of group I in the reply filed on 4/19/2010 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).
2. The specifics of claim 1 are taught in the prior art and therefore the restriction is proper.
3. The restriction is further maintained as claims 2-9, 11 have limitations not claimed in claim 10. Claim 10 is a structure claim whereas claim 2-9, 11 are dependant method limitations.

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

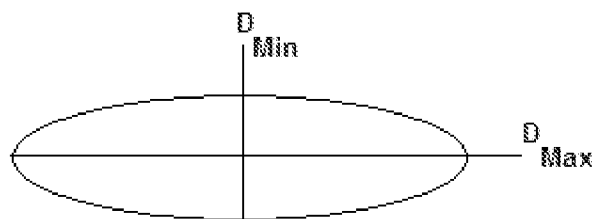
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1- rejected under 35 U.S.C. 102(b) as being anticipated by Fujimoto et al (JP 3733071 // USPAT 7,410,728).

Claim 1: Fujimoto teaches a lithium secondary battery that uses Si as an anode active material [Col 1-3]. The claimed limitation of "surface treating an anode current collector" is taught by the method of applying the Si to that anode, such as by sputtering

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or Chemical Vapor Deposition [Col 1 Ln 38-46]. The surface morphology is taught to have a grain boundary between 5-100 $\mu$ m and depth of more than 1 $\mu$ m as taught by the images of the surface morphology [Figure 6, 7, 15-16]. Figure 9 is particularly useful for analyzing the grain boundary and the depth. The applicant is to recognize that the grain boundary of the silicon is open for using the  $D_{\min}$  or  $D_{\max}$  as expressed below.



Claim 2: Fujimoto teaches a silicon application method at least of CVD and sputtering [Col 1 Ln 38-46].

Claim 5: Fujimoto teaches the use of an interlayer between the current collector base and the active material that acts as a “adhesive layer” [Col 1 Ln 57-62].

Claim 6: Fujimoto teaches the interlayer to be a material alloyable with the thin film of active material [Col 1 Ln 57-62]. Fujimoto then states the materials alloyable to the active material to include Zirconium [Col 3 Ln 3-15].

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 4 rejected under 35 U.S.C. 103(a) as being unpatentable over Fujimoto et al (JP 3733071 // USPAT 7,410,728).

The above rejection to claim 1 is used from above.

Claim 4: A method step for sputtering includes a bias voltage being applied to the substrate [Fabrication of Electrode a8]. This rejection is made because the specifics pertain to an anode formed with a Germanium active material. The applicant however established that it would be obvious to use Germanium or Silicon as active materials [Col 3 Ln 19, MPEP 2144.06]

Claim 6: Fujimoto teaches the interlayer to be a material alloyable with the thin film of active material [Col 1 Ln 57-62]. Fujimoto then states the materials alloyable to the active material to include Zirconium [Col 3 Ln 3-15]. The prior art teaches a limited number of possible solutions and therefore it would have been obvious for one of ordinary skill in the art to select one from the list provided within the prior art.

The prior art further teaches the use of either Copper or Nickel foil [Col 3 Ln 56-68].

Claim 7: Fujimoto establishes that an interlayer is important to the adhesion of the active material to the current collector foil [Col 1 Ln 57- Col 2 Ln 2]. Fujimoto further establishes that the method of applying active material is through CVD or sputtering [Col 1 Ln 38-46]. The sputtering process is taught to comprise a voltage bias to increase adhesion [Fabrication of Electrode a8]. Since Fujimoto teaches the alloyability and interchangeability of silicon and germanium, one of ordinary skill in the art would

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have ascertained the fabrication steps of applying an interlayer then sputtering silicon wherein the foil has a voltage bias in order to form an anode.

Claim 8, 11: A heating step is preformed to form electrode a2. Since this heating step is preformed as a final step, it is considered post formation of an interlayer [Col 10 Ln 49].

Claim 9: Fujimoto teaches the formation of electrode a1 to not have a heating step and electrode a2 to have a heating step at 400°C for 3 hrs. It is the examiner's position that time is a result effective variable because changing them will clearly affect the type of product obtained. See MPEP § 2144.05 (B). Case law holds that "discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art." See *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In view of this, it would have been obvious to one of ordinary skill in the art to utilize the heating step at various times including those within the scope of the present claims so as to produce desired end results. The end result would be a battery with improved charge and discharge cycle characteristics [Col 1 Ln 38-46].

5. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujimoto et al (JP 3733071 // USPAT 7,410,728). as applied to claim1 above, and further in view of Saito et al. (JP 2000336491).

Claim 2-3: Fujimoto teaches a nickel or copper foil with an interlayer and silicon active material in that respective order as explained in the rejections above. Fujimoto

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has expressed the desire to increase adhesion between the foil and the current collector. Fujimoto fails to teach applying a liquid etchant to the foil.

Saito teaches a process of using an etching agent that comprises ferric chloride and hydrochloric acid to roughen a nickel surface. Water is an obvious addition to any chemistry in order to control rate of etch through dilution. It would have been obvious to use this etchant in Fujimoto because Saito teaches an improved adhesive property of the nickel surface [Derwent Abstract].

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEPHEN YANCHUK whose telephone number is (571)270-7343. The examiner can normally be reached on Monday through Thursday 8:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/STEPHEN YANCHUK/  
Examiner, Art Unit 1795

/PATRICK RYAN/  
Supervisory Patent Examiner, Art Unit 1795